

Deficit irrigation reduces fruit quality in GRBV-infected Pinot noir grapevines

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Although deficit irrigation is used to improve fruit quality in healthy grapevines, it can potentially amplify negative effects of viral disease and reduce fruit quality in GRBV-infected grapevines. Therefore, a two-year field experiment was conducted to understand the interaction between GRBV infection and water deficits on disease development and vine physiology. "Wet" (W) vines were irrigated at 100% of estimated crop evapotranspiration (ET_c), while "Dry" (D) vines received water at 66 and 50% ET_c in 2017 and 2018, respectively. Healthy (GRBV-) and infected (GRBV+) vines were confirmed by PCR assays. There were no significant effects of irrigation treatment on disease symptom onset. GRBV+ vines had a higher Ψ_{stem} compared to GRBV- vines (0.12 MPa), but the effects of disease status only appeared post-veraison. Consequently, yields were significantly higher in W/GRBV+ vines (+42%). Ripening was delayed in GRBV+ vines (0.03 °Brix/day), and skin anthocyanin concentration was significantly reduced at harvest in GRBV+ fruit (-30%). Skin tannin concentration was increased in D/GRBV- vines (+15%), but was decreased in D/GRBV+ vines (-12%). In contrast, irrigation treatment had no effect on seed tannin concentration, with only disease status having a significant reduction (-17%). In general, irrigation treatment had little to no effect on berry seed flavonoids compared to disease status. Moreover, deficit irrigation reduced sugar and skin flavonoid concentration in GRBV+ fruit relative to controls. Although keeping GRBV+ vines well-watered may mitigate some of the negative effects of GRBV infection – and may even improve vine productivity – these results suggest that deficit irrigation may further reduce overall fruit quality in GRBV+ vines. Ultimately, the genetic control of fruit ripening imparted by GRBV infection seems to be stronger than environmental control imparted by water deficits. Thus, water deficits should be avoided in GRBV-infected Pinot noir grapevines.